CHAPTER VII – BICYCLE AND PEDESTRIAN FACILITIES

710 GENERAL REQUIREMENTS

Safe, convenient, and properly designed facilities are essential to accommodate and encourage bicycle riding and pedestrian movements. The purpose of these standards is to establish design criteria for the development of public bikeway and pedestrian facility construction. The following are selected City policy statements concerning bikeway and pedestrian facilities.

1. All bikeway and pedestrian facility development and construction provided and intended for public use shall conform to these standard specifications.

2. For all bikeway and pedestrian facilities that fall within wetlands or stream corridors, the City shall meet with the appropriate State and Federal Resource Agencies to review and assess site specific development compatibility issues prior to selecting any alternative for development.

    a. This review shall assess all potential and reasonable alternatives for these subject facilities in light of impacts to these affected areas.

    b. The review of the alternatives shall specifically consider the level to which impacts can (or cannot) be satisfactorily mitigated.

3. Bikeways shall conform to the design guidelines set forth in the Guide for Development of New Bicycle Facilities as published by the American Association of State Highway and Transportation Officials (AASHTO) and adopted by the Oregon Transportation Commission.

4. Bikeway signs shall be in conformance to the Manual of Uniform Traffic Control Devices (MUTCD), as supplemented and adopted by the Oregon Transportation Commission.

711 MULTI-USE PATHS

711.1 WIDTH AND CLEARANCE

(See Figure 1 and Standard Drawing 704)

The desirable minimum width for all multi-use paths shall be 10 feet in a 15-foot corridor. Only in extenuating circumstances that are due to unique topographic or other constraints shall path widths be permitted as narrow as 8 feet. Use of any path width less than 10 feet shall include satisfactory supplemental signing, striping, and lighting to ensure adequate user safety.

A minimum 1-foot width clear area should be maintained adjacent to both sides of the pavement; however, 2 feet or more is desirable to provide clearance from trees, poles, walls, fences, guardrails, or other lateral obstructions. A wider clear area on either side of the multi-use path can serve as a separate jogging path.

The vertical clearance to obstructions shall be a minimum of 8.2 feet. However, vertical clearance may need to be greater to permit passage of maintenance vehicles and, in undercrossings and tunnels, a clearance of 10 feet is desirable for adequate vertical clearance.

711.2 HORIZONTAL CURVES

See Standard Drawing 704)

Multi-use path horizontal curves shall have a minimum 35-foot centerline curve radius. Property line corner radii should be correspondingly curved to optimize corner sight vision with no less than a minimum of 25 feet.

When substandard radius curves must be used on multi-use paths because of right-of-way, topographical, or other considerations, standard curve warning signs and supplemental pavement markings should be installed in accordance with the MUTCD. The negative effects of substandard curves can also be partially offset by widening the pavement through the curve and removing objects impairing sight distance.

For most multi-use path applications, the super-elevation rate (i.e., a raised elevation of one side of the path) will vary from a minimum of 2 percent (the minimum necessary to encourage adequate drainage) to a maximum of approximately 5 percent (beyond which maneuvering difficulties by slow bicyclists and adult tricyclists might be expected). The minimum super-elevation rate of 2 percent will be adequate for most conditions and will simplify construction.

711.3 PAVEMENT STRUCTURE

(See Figure 1 and Standard Drawing 701)

The minimum acceptable pavement structure shall be 3 inches of Class "C" asphalt concrete above 4 inches of 3/4" - 0" crushed rock compacted to a dry density of 95 percent. The path subgrade shall be placed over a soil surface stripped free of any organic material and compacted to 95 percent dry density. Subgrades shall be sterilized with a suitable nonenvironmentally hazardous herbicide, that is approved by the City's Landscaping Department, to prevent subsequent intrusion of hardy weeds, vines, or other plant material into or upheaving through path surfaces.

Additional asphalt and subgrade reinforcement shall be provided in path sections projected to bear heavy maintenance vehicle traffic. No less than one additional inch of asphalt should be provided in these areas. Concrete pavement, of a comparable design section, shall be an acceptable path surface alternative. Use of concrete multi-use paths shall strive to minimize any surface jointing. Methods of obtaining necessary jointing shall be approved by the City.

711.4 GRADE

(See Figures 2 and 3)

Grades on multi-use paths should be kept to a minimum, especially long inclines. Grades better than 6 percent are undesirable because the ascents are difficult for many bicyclists to climb and the descents cause some bicyclists to exceed the speeds at which they are competent. Where terrain dictates, grades over 6 percent and less than 100 feet in length are acceptable only when consideration has been given to sight distance and stopping distances. Percent grade, in this situation, shall conform to the maximum allowable slopes represented in Figure 2. In areas of generally steep terrain, it may be desirable to meander path alignments in order to attain reasonable grades for steep slope ascent.

In no case should a "down-hill" approach grade of the intersection of a multi-use path to a sidewalk or street exceed 6 percent for the last 50 feet unless provisions have been made to provide satisfactory sight vision between the two intersection facilities.

711.5 SIGHT DISTANCE

(See Figures 3 and 4)

To provide users with an opportunity to see and react to the unexpected, a multi-use path should be designed with adequate stopping sight distances, particularly when paths intersect with streets.

Bicyclists frequently ride abreast of each other on multi-use paths and on narrow paths, bicyclists have a tendency to ride near the middle of the path. For these reasons, adequate sight vision capability should be provided at corners and intersections to maintain user safety. Where this is not possible or feasible, consideration should be given to widening the path through the curve, installing a yellow center stripe, installing a "curve ahead" warning sign, in accordance with the MUTCD, or some combination of these alternatives (refer to Figures 6, 7, and Standard Drawing 704). At path intersections, streets, abutting fences, landscaping, and other objects interfering with users' line of sight should not exceed 3 feet in height above the path centerline grade for 15 feet from the intersecting right-of-way.

711.6 LANDSCAPING

(See Figure 1)

Landscaping provides a very important role in the visual presentation of the multi-use path. Carefully planted trees, shrubs, and ground covers will soften the stark effect of the paved areas by offering periodic summer shade, wind buffer, nesting refuges for birds, a variety of spring to fall colors and aromas, and an opportunity to create different path "personalities". In the absence of landscaping, blank undeveloped borders often generate weeds, unmanaged briar patches, litter, dumping, and some user's disrespect that can generally lead to degradation of path appearance.

There are a number of important design considerations to review when selecting materials and planning planting schemes that should be followed. Trees are principally the primary concern regarding location and variety.

Specifically, placement and selection of trees should evaluate:

1. Tree rooting characteristics - to avoid potential path surface upheaval.

2. Tree size - trees should be of satisfactory caliper to permit a minimum trimmed height of 8.2 feet to the lowest branch.

3. Tree placement - to avoid creating "hiding" areas or permitting foliage to block path lighting (if present).

4. Foliage characteristics - The fallen leaves from many species of deciduous trees can create voluminous leaf piles and slippery hazards during the fall season of the year. Therefore, judgment should be given to tree selection based on the respective foliage "shedding" characteristics and the potential to produce resultant hazards.

Selection of shrubbery, bushes, and ground covers should include low maintenance varieties that are drought hardy, require little pruning, and are low growing (under three feet at mature height). Location and placement of these materials should not promote growth over or onto the path surface.

All proposed plant materials shall be approved by the Landscape Section of the Public Works Department.

711.7 FENCING

(See Figures 1, 5, and Standard Drawing 703)

Construction of a 5-foot high chain link fence adjacent to residential areas shall be required at the time of new multi-use path construction. The fence shall be constructed without a top rail (to deter climbing) and shall conform to standards established in the State of Oregon's Class 4 or 5 fencing requirements. Abutting property owners will be permitted, at their own expense, to install gates to their properties, as they so desire, provided open gate "swings" are limited to the property sides only, or they do not swing over the pathway surface.

711.8. INTERSECTIONS

(See Figures 6, 7, 8)

When intersections occur at grade, a major consideration is the establishment of right-of-way. The type of traffic control to be used (signal, stop sign, yield sign, etc.) shall be selected by application of the warrants in the MUTCD. Bicycles shall be counted as vehicles in these determinations, and thus bicycles may be given priority at some intersections.

Sign type, size, and location shall also be in accordance with the MUTCD. Care should be taken to ensure that multi-use path signs are located so that motorists are not confused by them and that highway signs are placed so that path users are not confused by them.

It is preferable that the crossing of a multi-use path and a street should occur at an intersection. Mid-block crossings should be discouraged unless it is the only practical alternative and adequate safe sight distance can be assured for all approaches to the crossing.

Multi-use path intersections and approaches should be on relatively flat grades (see sections on Grade and Sight Distance). Stopping sight distances at intersections should be checked and adequate warning should be given to permit bicyclists and other users to stop before reaching the intersection, especially on downgrades.

711.9 SIGNING AND MARKING

Adequate signing and marking are essential on multi-use paths, especially to alert users to potential hazards and to convey regulatory messages to bicyclists, pedestrians, and motorists at highway intersections. In addition, guide signing, such as to dictate directions, destinations, distances, route numbers, and names of crossing streets, should be used in the same manner as they are used on highways. In general, uniform application of traffic control devices as described in MUTCD will encourage proper user behavior. In multi-use path areas with limited sight vision or curves, a 4-inch wide yellow centerline stripe to separate opposite directions of travel should be considered. This is particularly beneficial in the following circumstances: (1) for heavy volumes of bicycles, (2) on curves with restricted sight distance, and (3) on unlighted paths where night time riding is expected. Edge lines (or fog lines) can also be very beneficial where nighttime bicycle traffic is expected. These lines should be 4" wide and painted white.

Care should be exercised in the choice of pavement marking materials. Some marking materials, for example, are slippery when wet and should be avoided in favor of more skid resistant materials.

General guidance on signing and marking is provided in the MUTCD. Part IX of the MUTCD refers specifically to traffic controls for bicycle facilities.

711.10 STRUCTURES

Multi-use paths constructed on steep hillside slopes or along drainage ditches where a 3 to 1 fill slope is impractical or impossible to achieve shall be protected with a handrail system.

An overpass, underpass, small bridge, or facility on a highway bridge may be necessary to provide continuity to a multi-use path. On new structures, the minimum clear width should be the same as the approach paved multi-use path and the

desirable clear width should include the minimum 1-foot side clear areas. Carrying the clear areas across the structures has two advantages: first, it provides a minimum horizontal shy distance from the railing or barrier, and second, it provides needed maneuvering space to avoid conflicts with pedestrians and bicyclists who are stopped on the bridge.

The minimum acceptable vertical clearance shall be 8.2 feet. Access by emergency, patrol, and maintenance vehicles should also be considered in establishing the design clearances of multi-use path structures. A vertical clearance of 10 feet is desirable for paths intended for motor vehicle use. Railings, fences, or barriers on both sides of a multi-use path bridge should be a minimum of 4.5 feet high. Smooth rub rails should be attached to the barriers at a handlebar height of 3.5 feet.

Bridges designed exclusively for bicycle traffic may be designed for pedestrian live loadings. On all bridge decks, special care should be taken to ensure that bicycle safe expansion joints are used. Decking boards shall be placed so that board joints are transverse to the direction of normal bike travel.

711.11 DRAINAGE

The recommended minimum pavement cross slope of 2 percent adequately provides for drainage. Crowning instead of sloping in one direction (although satisfactory) is preferred and usually simplifies the drainage and surface construction and limits abrupt path edge heights. Smooth surface is essential to prevent water ponding and ice formation. Where a multi-use path is constructed on the side of a hill or adjacent to residential areas with rear lot drains, a ditch of suitable dimensions shall be placed on the uphill side to intercept the hillside drainage. Such ditches should not create hazards for users. Where necessary, catch basins with drains should be provided to carry the intercepted water under the path. Drainage grates and manhole covers should be located outside of the travel path of users. To assist in draining the area adjacent to the multi-use path, the design should include considerations for preserving the natural ground cover. Seeding, mulching, and sodding of adjacent slopes, swales, and other erodible areas should be included in the design plans. Concentrated surface flows shall not be conveyed onto other parcels from multi-use paths.

711.12 LIGHTING

Fixed-source lighting reduces conflicts along paths and at intersections. In addition, lighting allows users to see the multi-use path direction surface conditions and obstacles. Lighting for multi-use paths is important and should be considered where riding at night is expected, such as multi-use paths serving commuters and locations at highway intersections. Lighting should also be considered through underpasses or tunnels and when nighttime security could be a problem. However, lighting is not appropriate in some wildlife habitat areas where nesting may be disturbed.

Depending on the location, average maintained horizontal illumination levels of 0.5 foot-candle (5 lux) to 2 foot-candles (22 lux) shall be considered. Where special security problems exist, higher illumination levels may be considered. Light standards (poles) shall meet the recommended horizontal and vertical clearances. Luminaires and standards shall be at a scale appropriate for a multi-use path.

711.13 VEHICLE TRAFFIC RESTRICTIONS

(See Standard Drawing 704)

Multi-use paths often need some form of physical barrier at roadway intersections to prevent unauthorized motor vehicles from using the facilities. Provisions can be made for a lockable, removable post (or "bullard") to permit entrance by authorized vehicles. The post should be permanently reflectorized for nighttime visibility and painted a bright yellow for improved daytime visibility. When more than one post is used, a 5-foot spacing between posts is desirable. Wider spacing can allow entry to motor vehicles, while narrower spacing might prevent entry by adult tricycles and bicycles with trailers.

An alternative method of restricting entry of motor vehicles is to split the entryway into two 5-foot sections separated by low landscaping. Emergency vehicles can still enter, if necessary, by straddling the landscaping. The higher maintenance costs associated with landscaping should be acknowledged and approved by the Public Works Director before this alternative method is selected.

711.14 REAR LOT LINE MULTI-USE PATH TREATMENTS

The City's system of multi-use paths, by their nature of integrating the residential sector with parks, schools, and open spaces, mandates some situations that "sandwich" path rights-of-way between residential lots. This is typical at park and school entries and where bike and pedestrian movements are desirable through

areas isolated by circuitous street networks or neighborhoods with a preponderance of cul-de-sac streets.

Where it is necessary to align a multi-use path between rear or side lot lines, the following shall be applicable:

1. Easements or rights-of-way for path construction and development shall be a minimum of 15 feet wide. When opportunities such as redevelopment of adjacent properties occur, existing substandard rights-of-way should be expanded. This should be employed when it is both amenable to affected property owners and widened corridors can be realistically achieved without creating peculiar offsets or by creating potential "hiding" areas.

2. The easement or right-of-way shall be bounded by a 5-foot high chain link fence installed without a top rail to discourage fence climbing.

3. Landscaping along paths shall be limited to ground covers and occasional trees of adequate size to permit a trimmed (pruned) height of eight feet at time of planting, and plant species with normal mature growth that does not exceed 3 feet in height.

4. The minimum property line radii for path corners (or intersections of path to path) shall be 25 feet.

5. Points of path access are encouraged at intervals of 300 feet, but no path segment should exceed 600 feet without some satisfactory point of entry or path outlet onto an adjacent street or open area (e.g., park).

6. Multi-use paths shall be illuminated per section 711.12.

711.15 RIGHTS-OF-WAY

(See Figures 1 & 2)

Rights-of-way for the development of all new multi-use paths that are intended for public use shall be provided at a minimum width of 15 feet. The Facilities Review Committee shall have the discretionary authority to require an additional 5 feet of right-of-way width if there are development factors such as:

1. Conditions where wider right-of-way improves the design and safety in steep terrain areas.

2. Conditions where it is desirable to maintain or utilize natural features or vegetation as an amenity to the path design.

3. Conditions where the wider right-of-way further enhances path user safety or security.

Rights-of-way shall be established at the time of site development and shall be officially secured by either an easement or dedication of property.

712 ON STREET FACILITIES

712.1 DRAINAGE GRATES

Drainage grate inlets and utility covers are potential problems to bicyclists. When a new roadway is designed, all such grates and covers should be kept out of bicyclists' expected path. On new construction where bicyclists will be permitted, curb inlets shall be used wherever possible to completely eliminate exposure of bicyclists to grate inlets. It is important that grates and utility covers be adjusted flush with the surface, including after a roadway is resurfaced.

Parallel bar drainage grate inlets can trap the front wheel of a bicycle causing loss of steering control and often the bar spacing is such that they allow narrow bicycle wheels to drop into the grates resulting in serious damage to the bicycle wheel and frame and/or injury to the bicyclists. These grates should be replaced with bicycle-safe and hydraulically efficient ones. When this is not immediately possible, consideration should be given to welding steel cross straps or bars perpendicular to the parallel bars to provide a maximum safe opening between straps. This should be considered a temporary correction.

While identifying a grate with a pavement marking, as indicated by the MUTCD, would be acceptable in most situations, parallel bar grate inlets deserve special attention. Because of the serious consequences of a bicyclist missing the pavement marking in the dark or being forced over such a grate inlet by other traffic, these grates should be physically corrected, as described above, as soon as practicable after they are identified.

712.2 RAILROAD CROSSINGS

Railroad-highway/multi-use path grade crossings should ideally be at a right angle to the rails. The greater the crossing approach angle deviates from this ideal crossing angle, the greater the potential for a bicyclist's front wheel to be trapped in

the railroad flangeway. It is also important that the roadway approach be at the same elevation as the rails.

Consideration should be given to the materials of the crossing surface and to the flangeway depth and width. If the crossing angle is less than approximately 45 degrees, consideration should be given to widening the outside lane, shoulder, or bicycle lane to allow bicyclists adequate room to cross the tracks at a right angle. In the case of multi-use path crossings, centerline stripes should be provided to encourage this right angle approach. Where this is not possible, commercially available compressible flangeway fillers can enhance bicyclist safety. In some cases, abandoned tracks can be removed. Warning signs and pavement markings shall be installed in accordance with the MUTCD.

712.3 TRAFFIC CONTROL

At intersections where bicycle traffic exists or is anticipated, bicycles should be considered in the timing of the traffic signal cycle, as well as the traffic detection device.

To check the clearance interval, a bicyclist's speed of 10 miles per hour and a perception/reaction/braking time of 2.5 seconds should be used. Detectors for traffic-actuated signals should be sensitive to bicycles and should be located in the bicyclist's expected path, including left turn lanes. Where programmed visibility signal heads are used, they should be checked to ensure that they are visible to bicyclists that are properly positioned on the road.

The MUTCD and the Oregon Supplement shall be consulted for guidance on signs and pavement markings. Where bicyclists are expected to use different patterns than motorists, direction signing shall be used to advise bicyclists of this special routing.

712.4 BICYCLE LANES

(See Figure 9)

Bicycle lanes shall always be one-way facilities and carry traffic in the same direction as adjacent motor vehicle traffic. Wrong-way riding is a major cause of bicycle accidents and violates the Rules of the Road stated in the Uniform Vehicle Code. Bicycle lanes on one-way streets should be on the right side of the street, except in areas where a bicycle lane on the left would decrease the number of conflicts (e.g., those caused by heavy bus traffic).

Bike lane minimum width shall be 4 feet as measured from the longitudinal gutter joint of a curb and gutter section or 5 feet from the face of a standard curb or guardrail. Bike lanes shall not exceed 6 feet in width. To examine the width requirements for bicycle lanes, Figure 9 shows three usual locations for such facilities in relation to the roadway.

Figure 9(a) depicts bicycle lanes on an urban curbed street where a parking lane is provided. The minimum bicycle lane width for this location is 5 feet. Bicycle lanes should always be placed between the parking lane and the motor vehicle lane. Where parking is permitted adjacent to a bicycle lane, it is preferable to designate separate parking and bicycle lanes as shown in Figure 9(a).

Figure 9(b) depicts bicycle lanes along the outer portions of an urban curbed street where parking is prohibited. Bicyclists do not generally ride near a curb because of the possibility of debris, of hitting a pedal on the curb, of an uneven longitudinal joint, or of a steeper cross-slope. Bicycle lanes in this location should have a minimum width of 5 feet from the curb face. If the longitudinal joint between the gutter pan and the roadway surface is uneven and falls within 5 feet of the curb face, a minimum of 4 feet should be provided between the joint and the motor vehicle lanes.

Figure 9(c) depicts bicycle lanes on a highway without curb or gutter. Bicycle lanes should be located between the motor vehicle lanes and the roadway shoulders. Bicycle lanes may have a minimum width of 4 feet where the shoulder can provide additional maneuvering width. A width of 5 feet or greater is preferable; additional widths are desirable where substantial truck traffic is present, on grades, or where motor vehicle speeds exceed 35 miles per hour.

At intersections, bicyclists proceeding straight through and motorist turning right must cross paths. Striping and signing configurations that encourage these crossings in advance of the intersection (see Figure 8), in a merging fashion, are generally preferable to those that force the crossing in the immediate vicinity of the intersection. To a lesser extent, the same is true for left turning bicyclists; however, in this maneuver, Oregon's vehicle codes allow the bicyclist the option of making either a "vehicular style" left turn (where the bicyclist merges leftward to the same lane used for motor vehicle left turns) or a "pedestrian style" left turn (where the bicyclist proceeds straight through the intersection, turns left at the far side, then proceeds across the intersection again on the cross street). Figure 8 presents examples of details on pavement markings for bicycle lanes approaching motor vehicle right-turn-only lanes. Where there are numerous left- turning bicyclists, a separate turning lane, as indicated in Part IX of the MUTCD, should be considered. General guidance for pavement marking of bicycle lanes is contained in the MUTCD.

Adequate pavement surface, bicycle-safe grate inlets, safe railroad crossings, and traffic signals responsive to bicycles should always be provided on roadways where bicycle lanes are being designated. Raised pavement markings and raised barriers can be dangerous obstacles for bicyclists and should not be used to delineate bicycle lanes.

712.5 SHARED ROADWAY

On highway sections without bicycle lanes, a right lane wider than 12 feet can better accommodate both bicycles and motor vehicles in the same lane and thus is beneficial to both bicyclists and motorists. In many cases where there is a wide curb lane, motorists will not need to change lanes to pass a bicyclist.

Also, more maneuvering room is provided when drivers are exiting from driveways or in areas with limited sight distance. In general, a lane width of 14 feet of usable pavement width is desired. Usable pavement width would normally be from curb face to lane stripe, or from edge line to lane stripe, but adjustments need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. Widths greater than 14 feet can encourage the undesirable operation of two motor vehicles in one lane, especially in urban areas, and consideration should be given to striping as a bicycle lane when wider widths exist.

712.6 BIKEWAY/WHEELCHAIR RAMPS

Intersection curb cuts or ramps, commonly referred to as wheelchair ramps, serve a multitude of user groups - these include, in addition to wheelchairs, bicyclists, the elderly (ranging from using walkers, canes, or adult tricycles), the visually impaired, or other handicapped persons. Due to this range of users and the variety of their needs when utilizing sidewalks, it is imperative that all intersections be equipped with an adequate system of ramps.

Design components for ramps must consider slope, width of the ramp, angle of approach, surface roughness, pavement appurtenances (i.e., catch basins, valve covers, etc.), and gutter smoothness. Curb ramps must meet the design criteria established by the Americans with Disabilities Act (ADA).

Slope of the ramp, including its wings, is one of the most critical elements to all of its users and should not exceed 8.33 percent. Effort should be made to strive for slopes that minimize the gradient as much as can be achieved for each situation.

The width of both the throat of the ramp and its adjacent wings is important, particularly when addressing the maneuverability of wheelchairs and adult tricycles. The acceptable minimum ramp throat width should be 5 feet wide with 6 feet of transition wing on each side at the face of the curb.

Generally speaking, a single ramp will safely accommodate sidewalk accessibility in residential areas when crossing local or neighborhood routes. However, where stormwater catch basin inlets are positioned in the middle of the curb return, use of double ramps is preferred to miss this hazard. On streets that are classified as collector or above, it is also prudent to utilize double ramps. In this heavier traffic environment, single ramps are frequently in a position where they force the user (particularly bikes or wheelchairs) into peculiar approach angles that can conflict with adjacent travel lanes or turning movements. Because of this auto conflict and the ability of double ramps to better meet the alignment of adjacent sidewalks it is recommended that they be used exclusively in all intersections that have a major street classification.

Ramps should have no more than a 1/2-inch lip at the gutter line and preferably no lip at all. The smooth transition is important here in preventing development of a tripping hazard or an unmanageable projection for wheelchairs. Too abrupt a lip is a hazard to wheelchairs going down a ramp as it will cause the chair to fall forward off the abrupt edge.

End of Chapter